NYC Environmental Protection

Carter H. Strickland, Jr.
Commissioner

Kathryn Mallon, P.E.
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November 14, 2013

Gary Kline, P.E.
Bureau of Water Compliance
New York City Municipal Compliance Section
New York State Department of Environmental Conservation
625 Broadway, 4th Floor
Albany, NY 12233-3506

Dear Mr. Kline:

As NYSDEC is aware the NYCDEP is close to completing the upgrade of the Gowanus Canal Flushing Tunnel pumping system. We anticipate activating the first of the three pumps on or about December 16th 2013. The remaining pumps will be activated starting in March 2014.

As requested and agreed to on the September 17th 2013 conference call with your office enclosed please find the Flushing Tunnel Start-up Plan designed to address the scouring and redistribution of sediment from the head end of the Canal upon activation of the pumping system.

Please let me know if you have any questions or comments.

Sincerely,

Kathryn Mallon

c: Kevin. F. Donnelly, Assistant Commissioner, BEDC
Kevin Clarke, Portfolio Manager, BEDC
Vincent Sapienza, Deputy Commissioner, BWT
Angela Licata, Deputy Commissioner, BEPA
Eileen Mahoney, Director, BEPA
John Rousakis, General Counsel, BLA
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Gowanus Flushing System – Start-up Plan

The Gowanus Canal flushing tunnel system was originally constructed by New York City in 1911 to flush water between the head end of the Canal and Buttermilk Channel at the west end of Brooklyn. The original flushing system incorporated a single propeller pump located at the Gowanus Facilities site and a 12-foot diameter, 6,070 linear-foot, brick tunnel connecting the head of the Canal to Buttermilk Channel. The system became inoperable in the late 1960s. In March 1999, DEP reactivated the system with the installation of a new, single propeller pump designed to flush water from Buttermilk Channel to the head end of the Canal. Although reactivated, the single pump system had reduced capacity and lacked redundancy. Subsequently, the system experienced degradation due to corrosion, resulting in periodic lengthy system shutdowns for repairs. Additionally, during low tide conditions, the flushing water flow would stop due to inadequate submergence of the propeller. The system remained in operation until 2010, when the current upgrade began. The estimated average daily flow range for this system was 0 mgd (at low tide) to 195 mgd (at high tide), with an average flow of approximately 154 mgd.

Through the Gowanus Facilities Upgrade project, DEP is in the process of upgrading the single pump system to a three pump system, which is intended to provide additional capacity, provide needed redundancy to maintain operation with one or two pumps out of service for maintenance or repairs, and allow for continuous operation through the tidal cycle. The projected flow range for the upgraded system is 175 mgd (at low tide) to 250 mgd (at high tide), with an average flow of approximately 215 mgd. The upgraded system will incorporate variable frequency drives that will allow the pump speed and flow rate to be adjusted according to the tides.

Bathymetric surveys performed prior to the flushing system shutdown (2009) and one year after the shutdown (2011) have revealed that sedimentation has occurred in some areas of the Canal, with significant build-up of approximately 12-feet of sediment in the immediate vicinity of the flushing tunnel outlet into the Canal.

The results of a CFD modeling analysis and related assessments (HDR-HydroQual, 2013) indicate that reactivation of the flushing system to its full capacity could scour approximately 1,000 cubic yards of sediment from a 6,500 square foot area in the vicinity of the tunnel outlet. Additionally, it is estimated that most of the material that would be potentially displaced over time would deposit in the upper / middle reaches of the Canal, with up to 10 percent of the this material, consisting of the finest grain-

size material, potentially being transported as suspended load to the mouth of the Canal into Gowanus Bay. At a reduced flow rate of approximately 100 mgd, the same assessments estimate that approximately 56 cubic yards of sediment could be displaced from the area in the vicinity of the tunnel outlet. The data from sediment samples collected from the scour zone indicates that contaminant concentrations are within the existing range of concentrations for surface sediments within the Canal. Any displaced material will eventually be dredged / removed as required by EPA's Record of Decision for the canal.

In wet weather, CSO Outfall 034 (located at the head of the Canal) can discharge additional flows to the Canal. Historically, the peak hourly flow rates from this outfall have been estimated to be up to 324 mgd, for a potential maximum total inflow to the Canal of approximately 575 mgd. Typically, sedimentsin the Canal tend to redistribute themselves spatially. Significant constrictions of flow, such as that which could be caused by the presence of barges or other fixed barriers, could also contribute to localized scouring and redistribution of sediments.

DEP accordingly proposes to implement the following start-up procedure, which is intended to mitigate the transport of sediments downstream from the head end of the Canal:

1. A system of two turbidity curtains will be installed within the upper 800-foot section of the Canal, as shown on the attached drawings. Each turbidity curtain will consist of woven, permeable geotextile panels suspended from a floating boom. The permeable panels will be provided in varying heights to accommodate the profile of the bottom of the Canal. A total of three sets of permeable panels will be available in varying heights to allow modifications to the system (i.e., installing longer panels), if necessary, during start-up of the flushing system. The shortest set of panels will be installed initially, with the intent of minimizing contact between the panels and the bottom of the Canal to limit disturbance of the sediments. The individual panels will not be tied together, allowing flow to pass between panels to minimize the velocity passing under the panels during higher flow conditions. The turbidity curtain system will be monitored and maintained by the contractor and will remain in-place throughout the duration of the start-up.

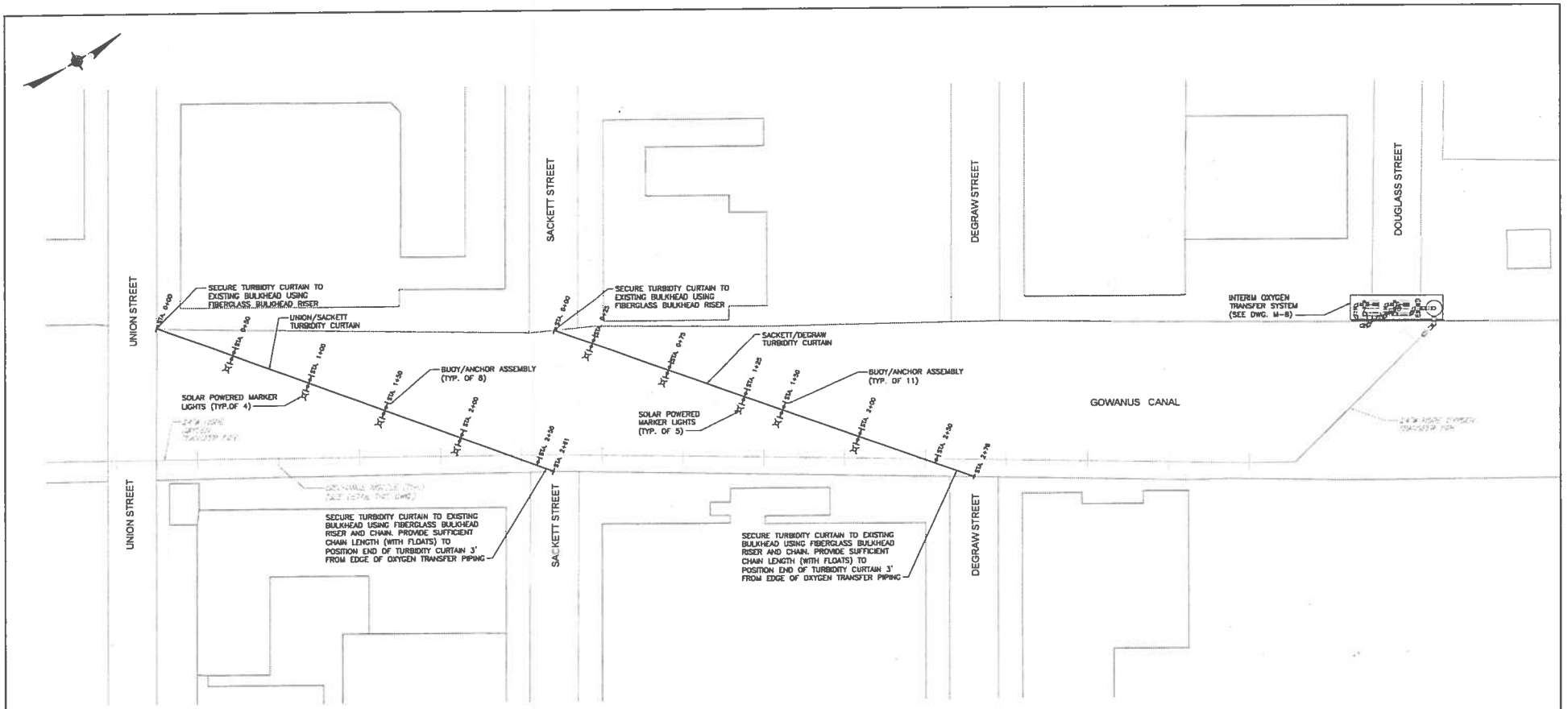
2. Start-up of the flushing system will occur in phases. In Phase 1, one new Flushing Pump will be installed and placed into operation by December 16, 2013. The initial flow rate will be approximately 50 mgd and will be gradually increased by increasing the pump speed via the

variable frequency drive to approximately 100 mgd over several days, during which time DEP will be monitoring the Canal to identify visible evidence of sediment transport. The intent is for the pump to be at its full speed flow rate of 100 mgd by December 20, 2013, and to operate at this flow rate for approximately weeks until the next phase of the start-up. isual monitoring will take place upstream and downstream of the turbidity curtains along the upper end of the Canal from the ends of Degraw and Sackett Streets, as well as from the Union and Carroll Street bridges. If necessary to mitigate significant observed sediment transport during this phase, the pump speed and flow rate will be reduced temporarily until a reduction in sediment transport is confirmed by visual monitoring.

3. Phase 2 of the start-up is scheduled to begin in early March 2014, at which point the second and third pumps will have been installed and will be ready to operate. Initially, the second pump will be placed into operation and the maximum flow will increase gradually to approximately 200 mgd. Similar to Phase 1, DEP will continue to monitor the Canal to observe for evidence of sediment transport and can reduce the flow rate as necessary through a reduction in pump speed on a temporary basis to mitigate the distribution of sediment down the Canal. After approximately one week with two pumps in operation, the third pump will be activated, which will result in a maximum flow rate of approximately 250 mgd.

4. ith the full system in operation, the turbidity curtains and visual monitoring of the Canal will remain in place for approximately one month, or until no observable sediment transport downstream from the head end of the Canal is evident, at which point the turbidity curtains will be removed and disposed of off-site, and the flushing system will remain in full, automatic operation.

DEP s intention in deploying the turbidity curtains is to help control sediment transport during the flushing system start-up. However, recogni ing that the presence of the turbidity curtains could contribute to locali ed scouring during wet weather periods, DEP has designed the system to allow individual panels to flex to allow flow to pass between and below them, thereby minimi ing scouring velocities under the panels. In addition, DEP intends to limit the duration during which the turbidity curtains are deployed to the duration of the flushing system start-up, which will minimi e the number of wet weather events that may occur while the system is in place.



PLAN
SCALE: 1"=30'

NO.	DATE	REVISION	BY
	11/7/2013	DSDC SOR	EJR
	11/4/2013	DSDC SO	EJR

DESIGNED EJR
DRAWN ARS
CHECKED MM
ENGINEER GMB
GROUP LEADER DFK

SCALE
1" = 30'
SCALE IN INCHES

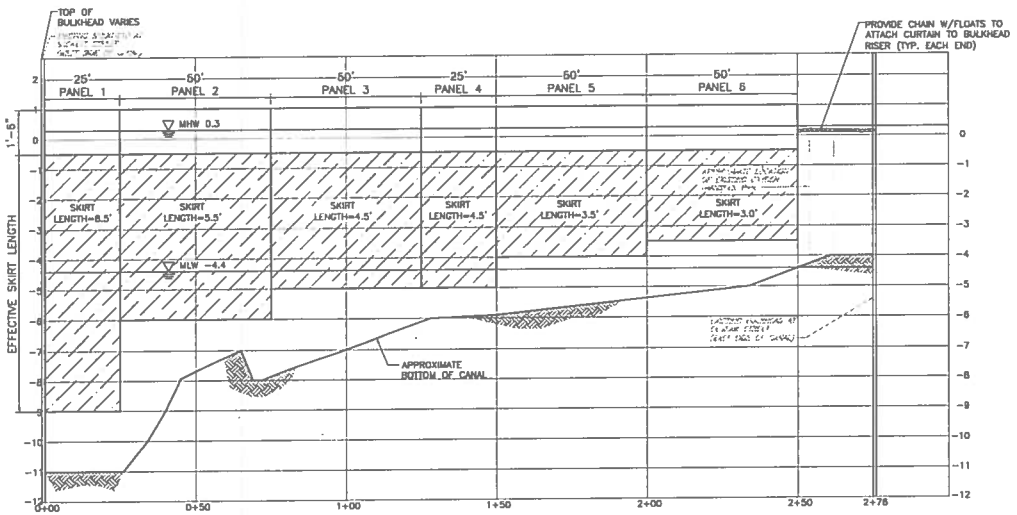
Dvirka and Bartilucci CONSULTING ENGINEERS
A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.

APPROVED FOR THE CITY OF NEW YORK
DENZIL TAPPE, P.E. Executive Project Manager
KEVIN CLARKE, P.E. Chief - Division Of Wastewater And Water Infrastructure And Support

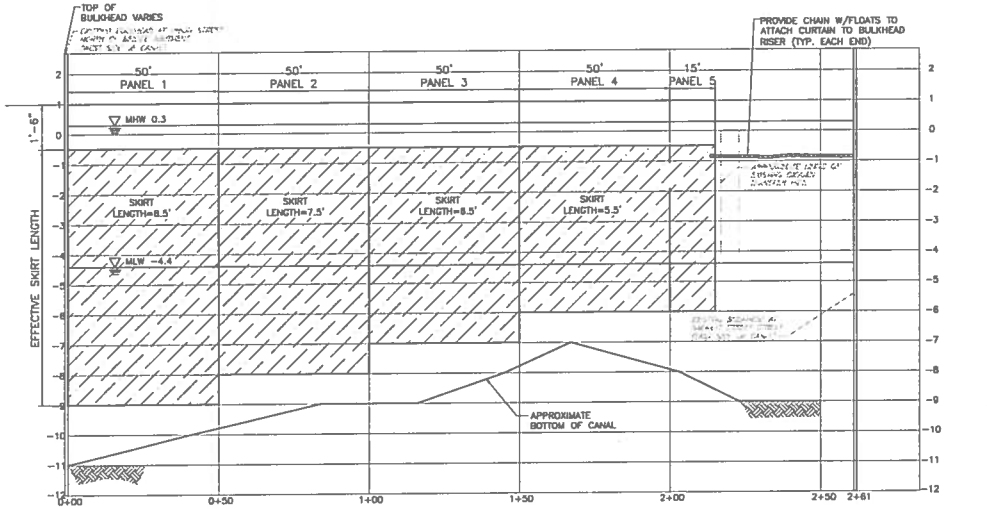
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF ENGINEERING DESIGN AND CONSTRUCTION
DIVISION OF WASTEWATER AND WATER INFRASTRUCTURE AND SUPPORT
CAPITAL PROJECT WP-169 CITY WIDE CSO FACILITIES

CONTRACT NO. CSO-GC-G
GOWANUS FACILITIES UPGRADE
FLUSHING TUNNEL PUMPING SYSTEM
SEDIMENT CONTROL PLANS
MECHANICAL

DATE NOV. 2013
SHEET XX OF XX
DWG. NO. M-9A



SACKETT / DEGRAW TURBIDITY CURTAIN PROFILE



UNION / SACKETT TURBIDITY CURTAIN PROFILE

NOTES:

1. CANAL SECTION BASED ON THE "INTERIM OXYGEN TRANSFER SYSTEM PROPOSED PIPELINE SURVEY" PREPARED BY NORTHEAST REMSCO CONSTRUCTION, INC., DATED OCTOBER 2011.
2. ALL ELEVATIONS ARE RELATIVE TO BROOKLYN DATUM.

NO.	DATE	REVISION	BY
	11/7/2013	DSDC 50R	EJR
	11/4/2013	DSDC 50	EJR

DESIGNED EJR
DRAWN ARB
CHECKED MM
ENGINEER GMB
GROUP LEADER DFK

SCALE

SCALE: HORIZ. 1"=30' VERT. 1"=2'

0 SCALE IN INCHES

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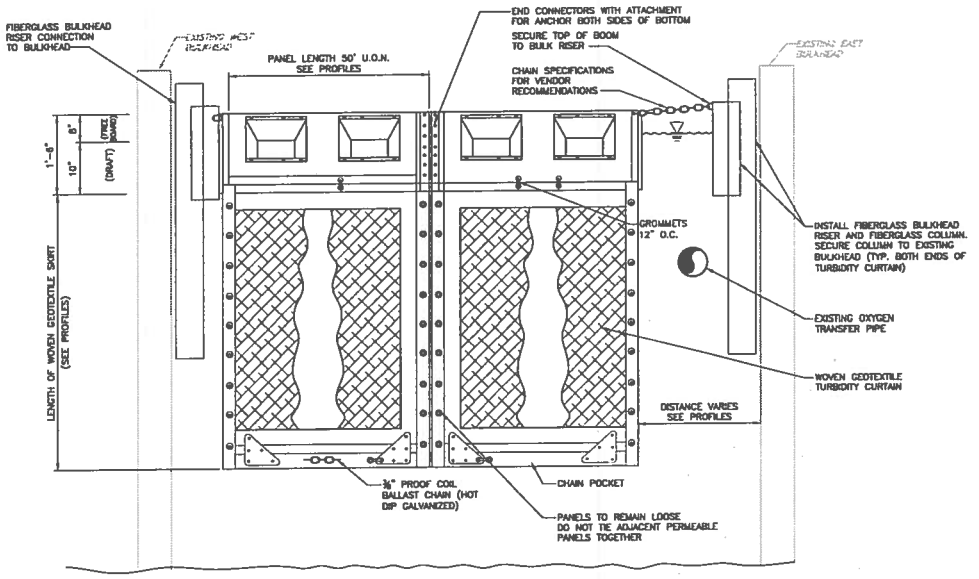
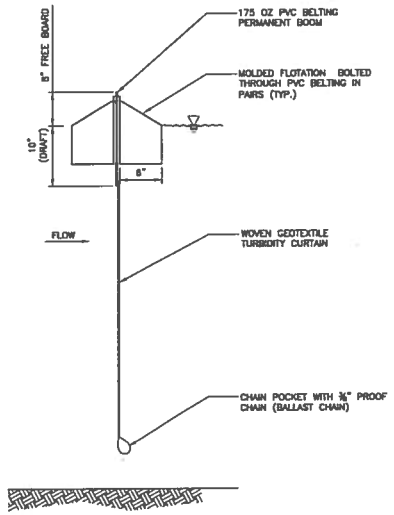
FLUSHING TUNNEL PUMPING SYSTEM
SEDIMENT CONTROL PROFILES
MECHANICAL

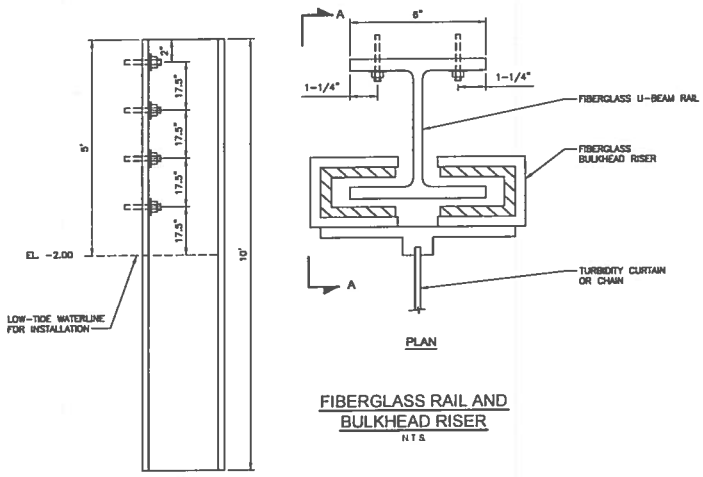
DATE NOV. 2013
SHEET XX OF XX
DWG. NO. M-98



TURBIDITY CURTAIN DETAILS
NTS



TURBIDITY CURTAIN SECTION
NTS



FIBERGLASS RAIL AND BULKHEAD RISER
N.T.S.

NO.	DATE	REVISION	BY
	11/7/2013	DSDC 50R	EJR
	11/4/2013	DSDC 50	EJR

DESIGNED EJR
DRAWN LVG
CHECKED MM
ENGINEER GMB
GROUP LEADER DFK

SCALE
AS SHOWN
SCALE IN INCHES

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CAPITAL PROJECT WP-189 CITY WIDE CSO FACILITIES

CONTRACT NO. CSO-GC-G
GOWANUS FACILITIES UPGRADE

FLUSHING TUNNEL PUMPING SYSTEM SEDIMENT CONTROL DETAILS
MECHANICAL

DATE NOV. 2013
SHEET XX OF XX
DWG. NO. M-9C

TURBIDITY CURTAIN SPECIFICATIONS

1.PERMANENT BOOM

- FREEBOARD – 8"
- DRAFT – 10"
- 175 OUNCE, PVC COATED POLYESTER BELT WITH UV AND MARINE INHIBITORS, 18 INCHES WIDE.
- LENGTHS AS SHOWN IN PROFILES.
- END CONNECTIONS – 18" ASTM SERRATED SLIDE UNIVERSAL CONNECTORS WITH ZINC ANODES
- ANCHOR POINTS – HANDLES ON EACH END CONNECTOR, BOTH SIDES OF BELT.
- FLOTATION – MOLDED POLYETHYLENE UV INHIBITED SHELL FILLED WITH COAST GUARD APPROVED MARINE GRADE CLOSED CELL FOAM. FLOTATION ATTACHED TO BELTING IN PAIRS WITH THROUGH BOLTING. FLOATS POSITIONED 3' – 0" ON CENTER. FLOATS SHALL BE SPILLMASTER SUPERFLEX FLOAT. GROMMETS LOCATED EVERY 1' TO ATTACH TURBIDITY CURTAIN TO LOWER EDGE OF BOOM.
- COLOR – BLACK BELTING WITH ORANGE FLOTATION
- PERMANENT BOOM AS MANUFACTURED BY PARKER SYSTEMS INC., 888–472–7537, OR APPROVED EQUAL.

2.PERMEABLE CURTAIN – TYPE I

- WOVEN GEOTEXTILE PRODUCED FROM SLIT FILM POLYPROPYLENE, BELTECH 200 AS MANUFACTURED BY BELTON INDUSTRIES OR APPROVED EQUAL. GEOTEXTILE PANELS FURNISHED BY PARKER SYSTEMS, INC.
- APPARENT OPENING SIZE (AOS) – 30 SIEVE – MINIMUM AVERAGE ROLL VALUE (MARV) ASTM D–4751.
- WATER FLOW RATE – 4 GALLONS PER MINUTE PER SQUARE FOOT (MARV) ASTM D–4491.
- GROMMETS EVERY 1' –0" TO CONNECT TO LOWER EDGE OF PERMANAENT BOOM AND FOR END TO END CONNECTIONS. REINFORCE EDGES AS REQUIRED.
- CHAIN POCKET ALONG LOWER EDGE TO RECEIVE BALLAST CHAIN.
- BALLAST CHAIN – 3/8 INCH PROOF COIL CHAIN – HOT DIP GALVANIZED, WITH END CONNECTORS, SHACKLES, COUPLINGS AS REQUIRED.
- SKIRT LENGTH AS SHOWN IN PROFILES, PANEL LENGTHS AS SHOWN IN PROFILES.
- SECURE TURBIDITY CURTAIN TO BOOM WITH POLY ROPE LACED THROUGH GROMMETS.
- ADJACENT ENDS OF PERMEABLE CURTAINS TO REMAIN LOOSE, NOT TIED END TO END.

3.FIBERGLASS BULKHEAD RISER

- PULTRUDED FIBERGLASS CONSTRUCTION
- 16 ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE (UHMW–PE) WHEELS
- UHMW–PE WEAR PADS
- ALL HARDWARE STAINLESS STEEL
- FLOTATION – SOLID POLYETHYLENE SHELL WITH CLOSED –CELL FOAM.
- RISER HEIGHT – 3 FEET
- PROVIDE FIBERGLASS BEAM TO SECURE BULKHEAD RISER TO EXISITING BULKHEAD. METHOD OF ATTACHMENT TO BE AS REQUIRED. BEAM LENGTH SUFFICIENT TO ACCOMMODATE FULL RANGE OF TIDE FLUCTUATIONS.

4.MARKER LIGHTS

- THE PENDULUM IS MADE OF 6061–T6
- ¾ INCH SCHEDULE 40 PVC PIPE WITH A ROTO–MOLDED, FOAM FILLED, SOLID POLYETHYLENE FLOAT DESIGNED FOR LONG LASTING USE IN ALL WEATHER CONDITIONS.
- PROVIDE A LIGHT ASSEMBLY WITH AMBER LED WITH ONE 200 HOUR RESERVE BATTERY AND A SOLAR PANEL RECHARGING SYSTEM.
- LIGHT TO OPERATE ON 1 SECOND DUTY CYCLE, 0.3 SECONDS ON AND 0.7 SECONDS OFF.
- LIGHT POSITIONED 1 METER ABOVE THE WATER LINE.
- SECURE TO BOOM WITH NYLON LANYARD AND STAINLESS STEEL SNAP HOOK.
- LEAD BALLAST SECURED IN BASE OF BUOY PENDULUM.
- WARRANTED FOR THREE YEARS.
- PERMANENT MARKER LIGHTS AS MANUFACTURED BY PARKER SYSTEMS, INC. OR APPROVED EQUAL.

5.ANCHORS AND BUOYS

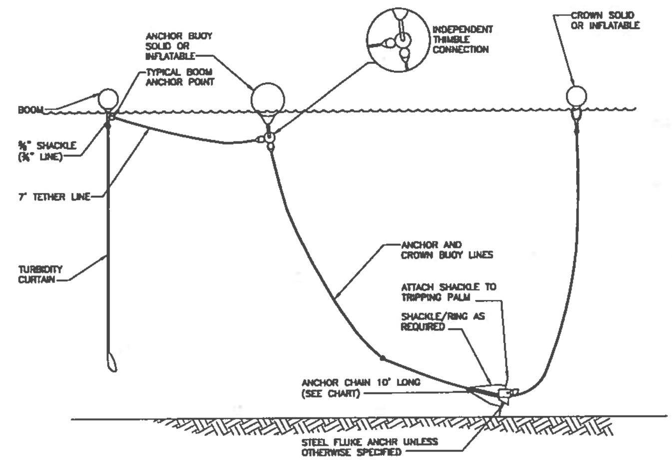
- PROVIDE ANCHORS AND BUOYS IN SETS.
- SECURE ANCHORS AND BUOYS TO ATTACHMENT POINTS AT EACH SEAM (JOINT) IN TURBIDITY CURTAIN.
- PROVIDE 65 POUND ANCHORS WITH LINES AND CHAINS TO MATCH. SEE DETAIL.
- PROVIDE ANCHORS AND BUOYS AS FURNISHED BY PARKER SYSTEMS, INC. OR APPROVED EQUAL.
- PROVIDE SIX(6) 3,000 POUND PULL OUT CAPACITY, DUCK BILL EARTH ANCHORS WITH CHAINS, CABLES, CONNECTORS, ETX. TO SECURE BOOM ENDS, AS NECESSARY. INSTALL IN SETS OF THREE ANCHORS, IF NECESSARY IN LIEU OF BULKHEAD RISER.

6.SPARES

- PROVIDE TWO (2) 50' LENGTHS AND ONE (1) 25' LENGTH OF BOOM AS SPARES. EACH SECTION TO BE COMPLETE, AS SPECIFIED, WITH ALL FLOATS, ATTACHMENTS, ETC.
- PROVIDE COMPLETE SETS OF SPARE PERMEABLE GEOTEXTILE PANELS, COMPLETE, FOR EACH TURBIDITY CURTAIN. EACH PANEL SHALL BE COMPLETE, AS SPECIFIED, WITH BALLAST CHAIN, LACING ROPES, GROMMETS, CONNECTORS, ETC. SEE TABLE, THIS SHEET FOR LENGTHS OF PERMEABLE CURTAIN PANELS.
- PROVIDE FIFTY FEET OF CHAIN AND FLOATS AS SPARE FOR THE PURPOSE OF ATTACHING THE BOOM TO THE EAST SIDE BULKHEADS.
- PROVIDE TWO (2) SPARE CARRIAGE ASSEMBLIES FOR THE BULKHEAD RISERS, COMPLETE, LESS BEAM.
- PROVIDE SIX(6) SPARE BUOY/ANCHOR ASSEMBLIES TO BE INSTALLED AS REQUIRED TO SECURE BOOMS.

7.MAINTENANCE AND REPAIRS

- PROVIDE WEEKLY INSPECTIONS AND REPAIRS AS REQUIRED FOR A SIX (6) MONTH PERIOD FROM THE INSTALLATION OF THE TURBIDITY CURTAINS.
- REMOVE AND DISPOSE OF OIL AND DEBRIS ACCUMULATIONS ON A WEEKLY BASIS, OR AS NEEDED.
- PROVIDE ALL LABOR, MATERIALS, PLANT AND SERVICES REQUIRED TO REMOVE AND CHANGE ONE COMPLETE SET OF PERMEABLE CURTAINS FOR EACH TURBIDITY CURTAIN. EFFECTIVE LENGTH OF REPLACEMENT SKIRTS TO BE SELECTED FROM SPARES AS DIRECTED BY THE ENGINEER.
- DISPOSE OF PERMEABLE SKIRTS THAT ARE REMOVED AFTER SERVICE.
- MAINTAIN AND SERVICE MARKER LIGHTS TO KEEP OPERATIONAL AT ALL TIMES.
- REMOVE AND DISPOSE OF BOTH TURBIDITY CURTAINS, BOOMS, PERMEABLE SKIRTS, CHAINS, ANCHORS, BUOYS, BULKHEAD RISERS, LIGHTS, ETC. UPON COMPLETION AND AS DIRECTED BY THE CITY.



BUOY/ANCHOR ASSEMBLY

NTS

NOTE: PROVIDE BUOY/ANCHOR ASSEMBLIES IN PAIRS SYMMETRICAL ABOUT BOOM

LINE AND CHAIN SIZES

APPROXIMATE ANCHOR WEIGHT	7' POLY TETHER LINE	NYLON ANCHOR, PENDANT, AND CROWN LINE	ANCHOR CHAIN SIZE	NYLON BULK LINE LENGTH GRAND TOTAL
65 LB.	3/4"	3/4"	1/2"	3 x WATER DEPTH

EFFECTIVE LENGTH OF PERMEABLE CURTAINS

SACKETT / DEGRAW

	PANEL 1	PANEL 2	PANEL 3	PANEL 4	PANEL 5	PANEL 6
SET 1	6'-6"	5'-6"	4'-6"	4'-6"	3'-6"	3'-0"
SET 2	7'-0"	4'-0"	3'-0"	3'-0"	2'-0"	1'-6"
SET 3	5'-0"	2'-0"	1'-0"	1'-0"	1'-0"	1'-0"

UNION / SACKETT

	PANEL 1	PANEL 2	PANEL 3	PANEL 4	PANEL 5
SET 1	8'-6"	7'-6"	6'-6"	5'-6"	5'-6"
SET 2	7'-0"	6'-0"	5'-0"	4'-0"	4'-0"
SET 3	5'-0"	4'-0"	3'-0"	2'-0"	2'-0"

NOTES

1. PROVIDE THREE (3) SETS OF PERMEABLE CURTAIN PANELS FOR EACH TURBIDITY CURTAIN
2. EFFECTIVE LENGTH OF PERMEABLE CURTAINS MEASURED FROM LOWER EDGE OF PERMANENT BOOM. EFFECTIVE LENGTH INCLUDES CHAIN POCKET
3. SET 1 CURTAIN LENGTHS AS PER PROFILES. SET 2 AND SET 3 PROVIDED AS SPARES
4. INSTALLED SET OF PANELS (SET 1, SET 2 OR SET 3) TO BE SELECTED AT THE TIME OF INSTALLATION

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	11/7/2013	DSDC 50R	EJR
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SCALE

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